

or whether the fish were pursuing or being pursued by some other creatures. Food must have been abundant, since a good many birds of some unknown species were present in the near distance, and there were great herds of small dolphins which made the water boil again around the ship. Annectant between the skipjacks (*Hemirhamphidæ*) and the flying-herrings (*Exocetidæ*) is Mr. H. W. Fowler's genus *Hemieocætus**. Less skilful again, but still, perhaps, foreshadowing the flying leaps of *Exocætus*, are the shoals of herrings and mackerel which on calm nights stir British waters into phosphorescence.

Instances of the jumping of fish of numerous kinds above the surface of the element in which they live are, as is well known, frequent.

One of the most interesting is that afforded by a close ally of the flying-fish, the little gar- or needle-fish (*Belone*), which came under the observation of Moseley †. These fish, he writes, when hotly pursued by the "skipjacks," "dashed out of the water, and by violent lashing of their tails managed to keep themselves above the water in a nearly upright position for a distance of several yards as they moved swiftly from the danger." The leap of the gar-fish as well as those of the whip-ray and king-fish have been beautifully figured by Mr. J. Turner-Turner ‡.

LVI.—*New Species of Indian Aculeate Hymenoptera.*

By Major C. G. NURSE, Indian Army.

THE insects dealt with in the present paper form part of a collection made by me during the last eighteen months. The greater part of the collection was made at Deesa, where I was stationed most of the time; but a number of Hymenoptera obtained during a two months' leave to Kashmir are also included, as well as a collection made by a native, whom I employed for two months at Mount Abu in 1901.

Deesa is situated at the extreme north of the province of Gujarat, being about 40 miles distant from Mount Abu. The climate is very hot and dry, and the rainfall, which in ordinary years averages from 25 to 30 inches, has been very

* 'Proceedings of the Academy of Natural Sciences of Philadelphia,' April 1901, pp. 293-294.

† *Op. cit.* p. 414.

‡ 'The Giant Fish of Florida,' 1902, plates opposite titlepage and pages 66 & 142.

short during the last few years, and the district has consequently suffered to a considerable extent from famine. The best months for collecting Hymenoptera are March and April, and again in September and October; but there is no month in the year when a certain number of species cannot be obtained, and some specimens occurred during the cold weather which I never saw at any other time.

I had previously collected at Deesa and elsewhere for about three years, and new species from my collections have already been described by Lt.-Col. Bingham in the *Journal of the Bombay Natural History Society*, by Mr. Cameron in the same *Journal* and in various other papers, some of which are still in course of publication, and by myself in the *Journals of the Bombay Natural History Society* and of the *Asiatic Society*.

In the present paper I have included descriptions or remarks on a few species already known, in cases where only one sex has hitherto been described, or where the descriptions published appear to require amplification. My collection contains, in addition to the species now described, and those enumerated in the papers mentioned above, a number of species which I have set aside as possibly new, but which require comparing with types, and also several which probably belong to new genera. These I have reserved for further study. The number of new species already obtained from a single locality so apparently unpromising as Deesa renders it highly probable that when the bees and wasps of India are more fully known, the number of species will considerably exceed the estimate of 2000 made by Bingham and others, although doubtless many so-called species will disappear as varieties as further material becomes available.

Mutilla Philippa, sp. n.

♂. Head and abdomen finely and shallowly, but not very closely, thorax somewhat more deeply punctured; antennæ rather shorter than the head and thorax united, third and fourth joints of the flagellum subequal; head somewhat narrower than thorax, eyes slightly emarginate, the vertex shining; mesonotum with two parallel longitudinal furrows from base to apex; median segment coarsely reticulate, widened and rounded posteriorly, with a wedge-shaped groove, widest above, bounded by carinæ; abdomen with the basal segment very small, with a ventral keel, which has a slight curve, and is dentate at apex. Head, thorax, and first abdominal segment black, remainder of abdomen light, shining, red;

scape of antennæ, head, thorax, and legs with somewhat long grey pubescence, thickest on the pronotum and scutellum; abdomen with golden pubescence. Wings fuscous, with three cubital cells; radial cell short, obtuse at apex, the apex of the third cubital cell not reaching beyond that of the radial cell; in the fore wing the third transverse cubital nervure and second recurrent nervure are narrower than the other nervures; nervures and tegulæ black.

Long. 12-14 millim.

Hab. Deesa; fairly common.

This species would come into Bingham's key on p. 9 after *M. Emeryi*, under a new section ϵ^2 . "Abdomen, except basal segment, red." In general appearance it looks like a small and faded male of *M. sex-maculata*, which sometimes has the apical abdominal segment red. But the scutellum is normal and very different from that of *M. sex-maculata* (see Cameron's description in Ann. & Mag. Nat. Hist. for July 1899, p. 62).

Mutilla suspecta, sp. n.

♂. Head, thorax and abdomen strongly punctured, the punctures on the median segment being larger and coarser than elsewhere; head narrower than pronotum, rounded posteriorly; pronotum transverse anteriorly, mesonotum and scutellum much raised, median segment rounded posteriorly; first abdominal segment rather short, at apex about one third the width of second segment, which is wider than thorax, apical abdominal segment rounded. Black, the antennæ rufous at apex; scape of antennæ, head, thorax and abdomen covered with silvery pubescence, intermixed with a few black hairs, the pubescence on the head and pronotum having a matted appearance; narrow apical bands on first and second abdominal segments, the whole of the third segment, and two median spots on the second segment, in addition to the apical band, one spot being basal and minute, the other apical and larger, the latter joining on to the apical band, all of silvery pubescence; apical abdominal segment with the black hairs predominating; legs with white pubescence, calcaria black. Both wings hyaline at base, infuscated at apex, the median third of fore wing with a flavous tinge, nervures and tegulæ black; radial cell very short, rounded at apex. The number of cubital cells varies from two to three; when the latter number are present the third is very much narrowed at the top, the second and third transverse cubital nervures almost joining at the radial nervure.

Long. 9-10 millim.

Hab. Deesa; several specimens.

This species is allied to *M. climia*, described by Mr. Cameron in the Journal of the Bombay Natural History Society, vol. xiv. p. 267; but M. André, to whom I sent a specimen, considers it distinct. I have always taken it in close proximity with *M. durga* (Bingh.), and strongly suspect it to be the male of that species.

Mutilla adscripta, sp. n.

♀. Head closely and rather coarsely, thorax rugosely punctured; abdomen with fine and close punctures hidden by pubescence; head large, wider than thorax, concavo-truncate posteriorly; thorax wider at apex than at base, the edges, viewed from above, rough and almost dentate; abdomen about as long as head and thorax united. Black, the thorax above dark red, the second abdominal segment is under the pubescence bright red, but this is not apparent until the pubescence is rubbed off; abdomen below red; pubescence on head and thorax greyish white, sparse above; abdomen with black velvety pile, second segment with two very large sublateral oval marks of golden pubescence, these spots sometimes, owing to attrition, appearing to coalesce, third segment with two sublateral round spots of white pubescence, fourth segment ciliated with white; sometimes the fourth and fifth segments have white spots similar to those on the third segment, but less clearly defined; legs spinose, with white pubescence, the spines black, calcaria pale.

Long. 6-8.5 millim.

Hab. Deesa; common.

Comes into Bingham's key on p. 3 after *M. pectinospinata*, but is a much smaller species, and differs from it in many respects.

Mutilla vincula, sp. n.

♀. Head and thorax coarsely punctured, the punctures of the abdomen hidden by the pubescence; head as wide as thorax, the latter, when viewed from above, subquadrate, the edges rough, rounded posteriorly; abdomen shorter than the head and thorax united, second segment considerably wider than thorax; pygidium finely longitudinally striate. Black, the thorax and median segment in the centre above red, leaving a black basal and lateral margin when viewed from above; head, including scape of antennæ, with white pubescence, matted and decumbent, the red portion of thorax with sparse golden, below with white pubescence; abdomen velvety black, apex of first segment ciliated with golden,

second segment with two median spots of silvery pubescence, one at base and one at apex, the basal spot the larger, also two ill-defined lateral larger spots of more sparse white pubescence, not entirely covering the black; third segment with a band of white pubescence, narrowly interrupted in the middle, a little white pubescence on the sixth segment; all the segments below with fringes of white pubescence; the legs spinose, with white pubescence, the spines black, calcaria pale; the whole of the head, thorax and abdomen more or less covered with erect black hairs, longer than the pubescence.

Long. 11-12 millim.

Hab. Deesa; rare.

This species would come into Bingham's key on p. 4 next to *M. blanda*, but it is larger, the pubescent band on the third abdominal segment is interrupted in the middle, and the thorax is red only in the centre above, not at the sides.

Mutilla argenteomaculata, Smith.

♀. The thorax and second (not first) abdominal segment are, when carefully looked at with a lens, not red but black, though the short depressed golden pubescence makes them appear at first sight red; the white pubescent spots on the abdomen are as follows: one median on first segment, one median basal, one median apical, and two lateral on second segment, one median and two lateral on third, fourth, and fifth segments, of which the median spot on third segment is frequently obsolete.

♂. The white pubescent spots on the abdomen are as follows: median apical on second to sixth segments, lateral on apical margin of second segment (often obsolete); the whole of the basal half of the third segment is also covered with white pubescence.

These notes are taken from a considerable series of fresh specimens, while Bingham's description was probably taken from an old or worn example.

Mutilla fumipennis, Bingham.

A variety of this species has the basal half of the fore wing clear hyaline instead of deep yellow.

Mutilla aversa, sp. n.

♀. Head closely but somewhat shallowly punctured, thorax striate in the centre above, punctured at the sides and

between the striations; abdomen apparently finely punctured, but the sculpturing is more or less hidden by the pubescence; head massive, broader than the thorax, eyes small, not emarginate, head behind them wider than their length; clypeus short, its apex hidden in the type specimen by the mandibles; thorax of equal width throughout, sloped gradually upwards to the scutellum, where there is a row of conspicuous teeth, and from whence the median segment is steeply sloped downwards, forming almost a right angle with the rest of the thorax; abdomen non-petiolate, second segment wider than the thorax, but not or scarcely wider than the head; apical abdominal segment punctured, with a median longitudinal keel. Black, the head and thorax above red; head and thorax with sparse greyish pubescence, intermixed with a few black hairs; legs with grey or white pubescence, tibiae very spinose, tarsi inclining to rufous, calcaria pale; abdomen with somewhat dense black pubescence, a round spot at the apex of first segment, a semicircular one at the apex of second, and a similar smaller spot at the apex of third segment, white; the long hairs on the apical segment and at the sides of the abdomen grey.

Long. 8 millim.

Hab. Deesa; not common.

Comes into Bingham's key, section B, after *M. ocellata*, and is allied to Cameron's *M. persuasa*, but the row of teeth at the apex of thorax suffices to distinguish it from either.

Mutilla optima, Smith.

♂. Stoutly built; head, thorax and abdomen closely punctured, the puncturing much hidden by the pubescence; head narrower than the thorax, eyes small, not emarginate; thorax subquadrate, median segment roundly truncate posteriorly; abdomen with the basal segment very short and narrow. Black, the mandibles in the middle, and the antennae below, dark red; head, pronotum, scutellum, a broad basal band, emarginate in the centre on the second abdominal segment, and the whole of the third and fourth segments with silvery pubescence; legs sparsely spinose, the spines and calcaria black, the pubescence silvery, except on the mesonotum, median segment, apical portion of the second and the fifth and following segments, where it is black; wings with only two cubital cells, the radial cell very short and rounded at apex; fore wing with the basal three fifths subhyaline, with a flavous tinge, remainder subfuscous; hind wing hyaline at

base, becoming somewhat darker at apex; nervures dark testaceous, tegulæ black or reddish black.

Long. 6-9 millim.

Hab. Deesa.

I took a specimen of the above *in coitu* with a female which I think is without doubt Smith's *M. optima*, and I subsequently obtained a long series of both sexes. They vary a good deal in size, especially the female.

Mutilla malinka, sp. n.

♀. Head and thorax closely but not very deeply punctured, abdomen with fine and somewhat sparse punctures; head as wide as thorax, when viewed from above almost round, the eyes small; thorax subquadrate, roundly truncate at base, rounded at apex; abdomen pseudosessile, shorter than head and thorax united. Head, antennæ, thorax, legs and apical two or three abdominal segments light red; abdomen immaculate, basal three or four segments very dark brown, almost black, their apical margins red; pubescence greyish white, sparse but long, especially on the abdomen.

Long. 4 millim.

Hab. Deesa; a single specimen.

This species, having the abdomen immaculate, comes into Bingham's key on p. 8, near to *M. pulchrina*. It is, however, only about a quarter the length of that species.

Mutilla officia, sp. n.

♂. Head somewhat sparsely, pronotum and mesonotum more closely and deeply punctured, median segment coarsely reticulate; abdomen somewhat sparsely and shallowly punctured; antennæ as long as the head and thorax united, the third joint of the flagellum slightly longer than the fourth; the portion of the vertex between the ocelli much raised; eyes emarginate, head slightly narrower than thorax; pronotum truncate anteriorly, gradually widening towards tegulæ; mesonotum with two parallel longitudinal furrows; scutellum with a slight median furrow, median segment convex, roundly truncate posteriorly, first abdominal segment with a ventral tubercle. Head, thorax, and basal and apical abdominal segments black, with sparse grey pubescence intermixed with some black hairs; remainder of abdomen light red and shining, with golden pubescence; legs with grey pubescence, calcaria white. Wings light fuscous-hyaline, paler, almost hyaline at base; three cubital cells, not extending beyond the apex of the radial cell, which is

short; measured on the cubital nervure, the first longest, second and third subequal; nervures and tegulæ black, the latter finely punctured.

Long. 12 millim.

Hab. Deesa; a single specimen.

This species comes into Bingham's key on p. 9 next to *M. Tornatorei* under a new sub-section, "second to sixth abdominal segments red."

Mutilla kraciva, sp. n.

♂. Head and thorax closely but rather coarsely punctured, the puncturing of the abdomen hidden by the pubescence; head small, not quite as wide as the thorax, eyes not emarginate, antennæ about as long as the head and thorax united; thorax transverse anteriorly, roundly transverse posteriorly, mesonotum and scutellum much raised, median segment rather steeply sloped; abdomen slightly petiolate, first segment with a ventral keel, pygidium transverse at apex. Black: head and thorax with white pubescence, which is somewhat long and matted, except on the mesonotum and scutellum, where it is sparse; first abdominal segment with an apical band of white, second, third, and fourth segments above entirely covered with thick bright golden-yellow pubescence, their apical margins, especially at the sides, ciliated with white hairs; fifth and sixth segments with large median round spots of white pubescence; second to fifth segments below with apical bands of white hairs, sixth and seventh segments above with black pubescence; legs moderately spinose, spines and calcaria black, pubescence white. Wings subfuscous, the basal half of fore wing lighter, with a slightly flavous tinge, base of hind wing subhyaline; three cubital cells, the radial cell short, its apex reaching to about the middle of the third cubital cell; nervures and tegulæ black, the latter punctured.

Long. 12 millim.

Hab. Deesa; one specimen only.

This handsome species would, according to Bingham's key, come on p. 9, somewhere near to *M. discreta*, but it is quite unlike that or any other species that I have seen.

Tiphia exacta, sp. n.

♀. Head and base of pronotum sparsely punctured, mesonotum almost impunctate; abdomen with a few shallow and scattered punctures; head, pronotum, mesonotum, scutellum and abdomen shining, median segment opaque, the latter

truncate apically, finely transversely striate, with three median longitudinal carinæ, slightly converging at apex, and reaching the verge of the truncation. Black, with sparse greyish pubescence; mandibles red in the centre; fore wing flavo-hyaline, hind wing hyaline, nervures testaceous, stigmata and tegulæ nearly black.

Long. 9 millim.

Hab. Kashmir, 5000–6000 feet. Three specimens.

This species is closely allied to my *T. conscia* described from Deesa in Journ. Bomb. Nat. Hist. Soc. vol. xiv. no. 1, p. 81. The latter should come into Bingham's key at p. 57 after *T. consueta*, and not as stated by me in describing it, as the tarsi are black, not testaceous. The present species is larger than *T. conscia*, the fore wing has a more decidedly flavous tinge, and the median segment is distinctly, though very finely, transversely striate, and not smooth.

Myzine apimacula, Cam.

♂. Head, thorax and abdomen sparsely punctured, shining, clypeus rounded anteriorly, the apex curved inwards, scarcely emarginate; head about the width of pronotum, which is transverse anteriorly, median segment narrower than pronotum, rounded at sides and apex; abdomen nearly half as long again as head and thorax united, almost pseudo-sessile, the petiole being extremely short, all the segments more or less constricted. Black: the clypeus anteriorly, two lateral spots at base of the pronotum and its apex narrowly, a spot on all the tibiæ at base, the tarsi, and transverse median spots on abdominal segments 2–5, with minute lateral spots on the same segments, pale yellowish white; mandibles, flagellum of antennæ, and apical three abdominal segments dark red; wings hyaline, nervures and stigmata testaceous, tegulæ pale yellow, with a black median spot.

Long. 9 millim.

Hab. Deesa.

This species would come into Bingham's key on p. 65 under a new subsection *a'*. "Abdomen black at base, red at apex." When Cameron described the female I had only taken that sex, but I subsequently obtained the male above described, which I feel sure is of the same species as the female described by Cameron in Journ. Bomb. Nat. Hist. Soc. vol. xiv. no. 2, p. 272.

Scolia pila, Nurse.

When I described this species in the Journ. Bomb. Nat. Hist. Soc. vol. xiv. no. 1, p. 82, I had not a specimen of

the female. I have now obtained that sex, of which the following is a description:—

Similar to the male, but more slenderly built, the head almost impunctate; clypeus with the centre much raised, shining; the ground-colour is dark red, and not black, the head, except the mandibles and antennæ, being entirely orange-yellow, and the markings on the thorax and abdomen of the same shade, and not bright yellow as in the male.

Long. 12–13 millim.

Hab. Deesa.

Scolia vivida, Smith.

The female of this species has not, I believe, been hitherto described.

Head smooth, except the portion of the front near the base of antennæ, which is somewhat closely but irregularly punctured, and a few punctures on the vertex near ocelli; thorax closely punctured, the punctures, especially those on the median segment, being shallow; abdomen impunctate. Dark red, the clypeus being somewhat lighter; a broad irregularly-shaped transverse band across the head in front of the anterior ocellus, reaching into the emarginations of the eyes, the vertex posteriorly, and the cheeks, yellow; the second, third, and fourth abdominal segments are black above, with broad median yellow bands, narrowed in the centre. Wings similar to those of the male. Pubescence on the red portion of the body and on the legs rufous, elsewhere greyish.

Long. 16–17 millim.

Hab. Deesa; not common.

Elis rubricata, sp. n.

♂. Head, thorax and abdomen pubescent, the pubescence on the former two hiding the sculpturing, the latter smooth and shining; clypeus convex, transverse anteriorly, bare and shining in the centre; median segment short, the sides rounded posteriorly; first abdominal segment long, subpetiolate, and much constricted. Black: the clypeus, except a large triangular spot in the centre, and a line on the anterior and intermediate tibiæ above, pale yellow; an obscure narrow apical band on first, wide apical bands on the second and third, the whole of the fourth, fifth and sixth, and the apex of seventh abdominal segments, dark red, the red band on the third segment emarginate in the centre; abdomen black below; pubescence hoary grey, except on the red portion of the abdomen, where it is fulvous red. Wings,

with two cubital cells, clear hyaline, nervures testaceous, tegulæ very pale testaceous; the costal margin of the fore wing has a very faint inclination to yellow.

Long. 15 millim.

Hab. Deesa; a single specimen.

This species would come in Bingham's key on p. 92 under a new heading "C." Male known, female unknown.

Pseudagenia mutilata, sp. n.

♀. Head, thorax, abdomen and legs sparsely pruinose; clypeus very convex, much broader than long, its apex much produced, the sides rounded; eyes slightly convergent above, median segment gradually sloped, the sides rounded; posterior portion of metanotum with a deep median longitudinal groove, continued on to the median segment, where it becomes shallow and inconspicuous; both these segments longitudinally striate, the former finely, the latter less finely; legs long, tibiæ and tarsi with minute spines. Head and thorax black; abdomen dark red; mandibles at apex, clypeus anteriorly, inner margin of the eyes narrowly, antennæ, anterior legs except the coxæ and the tegulæ, more or less red; intermediate and posterior legs reddish black; wings subhyaline, nervures testaceous, stigmata paler.

Long. 9 millim.

Hab. Deesa; a single specimen.

This species would come into Bingham's key on p. 108 under "C," new subsection "c." "Head and thorax black, abdomen red."

Salix avidus, sp. n.

♀. Smooth and shining, the median segment lightly transversely striate, second and third abdominal segments at base with minute and shallow punctures; head broader than thorax; clypeus very convex, its anterior margin raised and transverse; an impressed line from the antennal tubercles to the anterior ocellus; pronotum with its posterior margin slightly depressed; an obscure median longitudinal groove on the median segment. Black, with sparse and short silvery pile; apex of abdomen with long reddish hairs; wings flavo-hyaline, nervures testaceous, tegulæ black; tarsal claws unidentate.

Long. 12-14 millim.

Hab. Mount Abu; not common.

This species would come in Bingham's key on p. 126 after *S. verticalis*, in a new section "e²." "Entirely black."

[To be continued.]